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ENGINEERS
AUSTRALIA

Introduction

Screen 1 (Title screen – Make it so – you can be an engineer!)

Hi everyone. My name is _____ and I've come here today to talk to you about being an engineer.

So what is an engineer?

Screen 2 (popcorn)

So what would the world be like if there were no engineers?

Well, you couldn't make popcorn in a popcorn machine ...

Screen 3 (computer game)

... you couldn't play any games on the computer ...

Screen 4 (tap water)

... you couldn't even drink water out of a tap ...

Screen 5 (car movie)

... there's no way you could watch movies in the car ...

Screen 6 (Wii)

... and you couldn't play games like Wii or Playstation in your lounge room ... without an engineer!

We can do all of this because engineers worked out how to make it possible. This is what an engineer does – engineers 'make it so' you can do all this, and more!

Engineers

Screen 7 (subtitle screen: what's it all about)

So how do engineers 'make it so'? What are engineers?

Screen 8 (engineers are ...)

Well firstly, engineers are people who are creative. When they have a problem to solve, they use their imagination! Their job is to come up with the best way to fix a problem.

Then, engineers have to work out how to turn the idea in their heads into something real that everyone can use. That means engineers use maths and science to turn a cool idea into the real thing!

To do all that, it's good to have some help. That's why engineers like to work in teams. It's much easier to solve a problem when everyone works together.

There are lots of things around us that engineers created. Engineers have designed and built almost everything you can think of! Here are just a few of the things engineers have helped make...

Screen 9 (jets fly faster)

Planes were made possible by engineers! Working out how to make a big heavy machine stay up in the sky was the first step – now engineers are working out how to make jet planes go even faster.

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Screen 10 (solar plant, environment)

Engineers are also working hard helping the environment.

These big solar panels collect sunlight and turn it into power that we can use in our homes and schools.

Engineers are working out ways to make solar panels even better at collecting sunlight. Solar power means less pollution in the air, so this is much better for the environment!

Screen 11 (robots)

Did you know we already have robots working for us?

Engineers invented robot technology, and this is used in factories to make cars and machinery. The robots can make things much faster than a human can – although they still need a human to guide them!

What about having a robot in your home? Engineers are building robots to help us around the house. Maybe if you were an engineer, you could build a robot to clean your room for you!

Screen 12 (outer space)

Engineers are the people who took us into outer space!

How does the space shuttle get off the ground? How does the space station stay up above the planet? And how do astronauts stay alive in space, where there's no oxygen, or food and water? Working out how to make all these things happen is the engineers' job.

Where do they work?

Screen 13 (where do engineers work?)

These are just a few of the things that engineers have done.

So imagine you are an engineer. If you got up every morning to go to work, where do you think you would go?

Screen 14 (where engineers work: Antarctica)

Here's one place you might not have thought of – Antarctica!

Australia has four Antarctic stations for scientific research. Electrical and mechanical engineers work there, helping the scientists keep all their science equipment running perfectly.

And they help run the machines that keep the cold out, too!

Screen 15 (where engineers work: F1 car racing)

What about the race track? Yes, engineers are working here too!

All cars are built with the help of engineers. Formula 1 cars are designed to go as fast as possible, and stick to the race track as much as they can. Engineers work out how to 'make it so' these cars get faster and faster in every race!

Screen 16 (where engineers work: music studios)

It's not all just about machines and buildings, though. Here's another unusual place to work – in a music studio!

Audio engineers work in music, film and TV. They help set up and run the equipment used to record the music you listen to and the TV shows you watch. Next time you hear your favourite song or watch TV, remember that engineers helped make it happen!

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Screen 17 (where engineers work: clothing)

What about the clothes you wear – do engineers have anything to do with these?

Well yes, engineers help invent new fabrics for our clothes. They could be working outside with plants, or inside a laboratory with fashion designers, or at a factory where clothes are made. They invent special fabrics for things like the swimsuits that our swimmers wear at the Olympics, and the spacesuits that astronauts wear in space.

Screen 18 (building site)

Engineers help work out how to construct the buildings around us, like houses, schools and shopping centres. They are in charge of designing how buildings are made and making sure buildings stay up! They also work out how things like water, gas and electricity are designed into the building – so you can turn on a light or get a drink of water.

Case studies

Screen 19 (case study intro screen)

Engineers have helped make some really amazing things. Here are just a few of them!

Screen 20 (world's tallest building – screen 1)

This tower in Dubai is the tallest building in the world – and it's not even finished yet! When it is finished it will be 818 metres high, with 162 floors from top to bottom. The tallest building in Australia is 323 metres high – this tower is nearly 3 times as tall!

It is so tall that if you stacked 400 cars, on top of each other – it would still be taller! It cost \$1 billion US dollars to build, which equals almost 2 billion Australian dollars, and it weighs the same as 100,000 elephants (and you need an engineer to help you weigh an elephant!).

This skyscraper is held up by concrete and steel rods. If you turned all the concrete into one long footpath, it would be 1,931 kilometres long. If you put all the steel rods together end to end, they would stretch more than a quarter of the way around the world.

That is one massive building!

Screen 21 (world's tallest building – screen 2)

So how did engineers help create the world's tallest building?

The hardest part is getting it to stand up straight in the wind. Engineers worked out that they should give the building different shapes all the way up to the top. This way, when a strong wind hits the building it gets turned in different directions, so it doesn't hit the building with too much force.

Engineers also helped create special concrete and steel beams. These had to be extra strong to hold up all the floors. Engineers also had to work out how to make the building strong enough to survive an earthquake, and also not sink into the ground.

That's a lot of hard thinking and team work to make a really amazing building!

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Screen 22 (world's fastest rollercoaster – screen 1)

Check out this gigantic rollercoaster – it's the fastest and the tallest rollercoaster ever built!

This is the Kingda Ka Rollercoaster in America. When you step into one of the trains on this incredible ride, you'll speed up to a scary 206 kilometres per hour. That's much faster than a normal car or motorbike is allowed to go!

Screen 23 (world's fastest rollercoaster – screen 2)

Engineers designed all the loops and hills in the track, and worked out how strong to make all the tracks so they would stay up so high in the air.

The rollercoaster uses hydraulics to push the trains along the track at massive speeds. Engineers worked out how to make it go so fast while keeping it safe enough for people to use.

They also had to make sure the trains stayed on the tracks, and the people stayed in their seats – even when they're upside down and moving at top speed!

Screen 24 (wave energy – screen 1)

But engineering isn't always about the biggest and the fastest – sometimes it's about making a really simple idea work well. Take these for example – they might just look like balloons floating in the sea, but they could soon be running all the electricity in your home!

These balloons are part of a new kind of power station that uses waves instead of gas or coal. A normal power station can make the environment very dirty, but this power station uses passing ocean waves instead of gas or coal. Because there's no smoke, dirt or waste left over, it's much better for the planet.

Screen 25 (wave energy – screen 2)

To create this new clean energy, engineers had to work out what size waves would drive the system. If the wave was too small or didn't happen very often, then the balloons wouldn't move enough. If the waves were too big, the balloons would get pulled off the bottom and float away.

Then they had to find the places off the coast that had these kinds of waves, and put some test balloons in place to see how well they worked. These test balloons are just off the coast of Western Australia – I bet if you went past on a boat, you wouldn't even know that there was a brand new power station there!

Screen 26 (hands-free games – screen 1)

Some of the best engineering is also the most fun – like making games even better! Engineers are working on ways to make new games where you don't even need to use a controller.

These games use a 3D camera that watches where your arms and legs are when you move, and matches your movements with the game on the screen. So if you're playing a football game, all you have to do is put your foot out and kick the air.

You could use this sort of game to learn how to drive a car, or try on some new clothes from a shop, or paint a mural on a wall – or maybe just practice footy on a wet afternoon!

Screen 27 (hands-free games – screen 2)

To make these games, engineers had to design a special video camera that could follow your movements, and could tell where you were in the room. It also had to be able to tell the difference between you and your friends – so you can play the same game together.

And they had to design software that was fast enough to keep up with you – especially if you're a really good footy player!

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Conclusion

Screen 28 (you could be an engineer –vehicle/structure image)

So if you decided to be an engineer, you could help invent amazing things like new cars and buildings.

Screen 29 (you could be an engineer –plan/diagram image)

Engineers look at the world around us and try to find ways to make it better. You could be an engineer and do that too!

Screen 30 (you could be an engineer –enviro image)

If you were an engineer, you could help find new technology to help the environment.

Screen 31 (you could be an engineer –travel around the world)

Engineers work all over the world – and sometimes above it! One day you could be an engineer and work on the land, underground, underwater or even in space.

Screen 32 (segue to activities)

You could use your imagination and MAKE IT SO your ideas become reality!

Why don't we try it now? You can use your ideas and work out how to solve a problem in the next activity.*

Let's give it a try.

*this text can be altered/extended, depending on the activities you choose.